

## 1997 ELECTRICAL

## General Motors Corp. - Starters

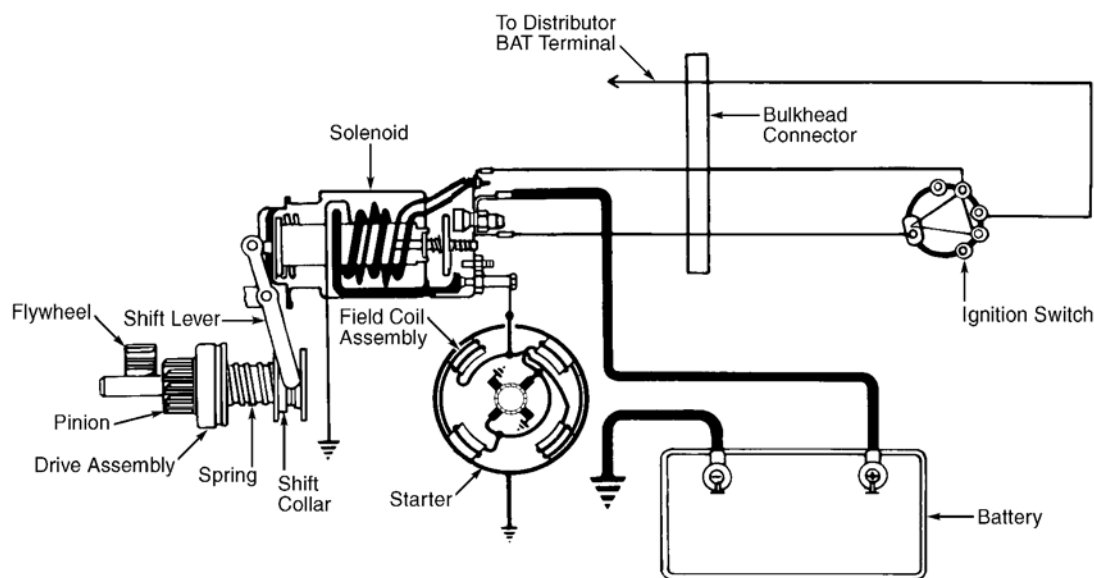
## DESCRIPTION

When the ignition switch is turned to the START position, the Delco-Remy starter solenoid windings are energized. This causes the solenoid plunger to move the shift lever, which engages the pinion with the engine flywheel ring gear. The movement of the plunger also closes the main solenoid contacts, applying battery voltage to the starter motor. See **Fig. 1**.

When the engine starts, the pinion will overrun, protecting the armature from excessive speed and the flywheel from damage. When the ignition switch is released, the plunger return spring disengages the pinion.

On starters with the SD designation, used on gasoline engines only, the pinion is driven directly by the armature shaft. Wound field coils energize pole pieces that are arranged around the armature.

Starters with the PG designation, used on diesel or large displacement gasoline engines, have a pinion that is driven by a gear reduction system. These starters are easily identified by 3 Torx bolts that retain the solenoid. The PG starter should not be disassembled and is serviceable only by complete replacement.



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**Fig. 1: Typical Cranking Circuit**

Courtesy of GENERAL MOTORS CORP.

## COMPONENT LOCATIONS

## COMPONENT LOCATIONS

## 1997 Chevrolet S10 Pickup

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Component	Location
Battery Junction Block	Left Rear Of Engine Compartment
Clutch Pedal Position & Cruise Control Shutoff Switch	On Clutch Pedal Support Bracket
Instrument Panel Fuse Block	Left Side Of Instrument Panel
Transmission Range Switch	Left Side Of Automatic Transmission
Starter Relay	Center Rear Of Engine Compartment
Transfer Case Shift Control Module	Behind Center Of Instrument Panel

## TROUBLE SHOOTING

**NOTE:** For information not covered in this article, see the **TROUBLE SHOOTING - BASIC PROCEDURES** article in the **GENERAL INFORMATION** section.

### TROUBLE SHOOTING HINTS

Note condition of SECURITY indicator light. If indicator stays on or flashes continuously troubleshoot anti-theft system. Check starter solenoid terminals and battery grounds. Check for proper installation of aftermarket electronic equipment. Perform self-diagnostic system test, to be certain no trouble codes are stored in PCM memory which may lead to misdiagnosis. See appropriate **TESTS W/CODES - 2.2L** or **TESTS W/CODES - 4.3L** article in ENGINE PERFORMANCE section.

Check Black fusible link located at generator, Blue fusible link located at battery and Black fusible link located at battery junction block. Check 10-amp CRANK No. 20 fuse, located in instrument panel fuse block. See **COMPONENT LOCATIONS** table.

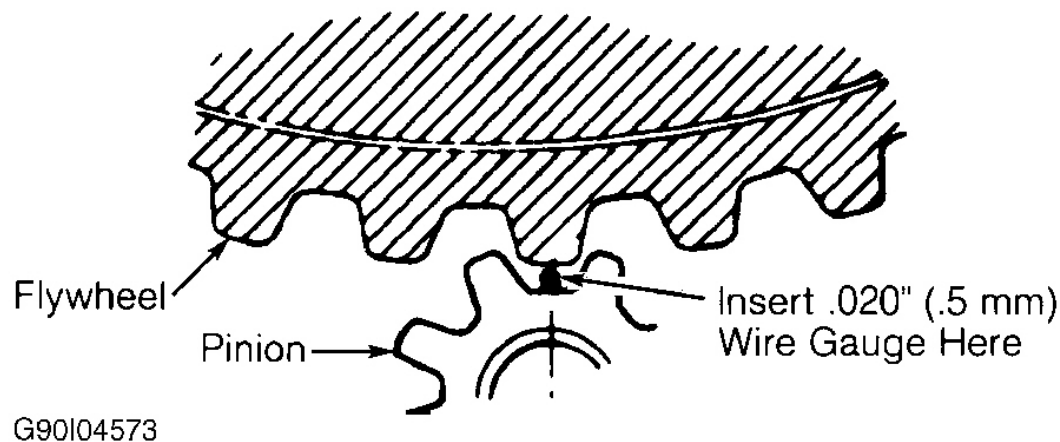
### STARTER NOISE

**CAUTION:** Never operate starter for periods of more than 15 seconds. Excessive cranking can cause starter to overheat. Allow starter to cool for at least 2 minutes after each time operated.

**NOTE:** Check flywheel ring gear for damage.

1. A high-pitched whine, heard while cranking (before engine starts), indicates excessive distance between starter pinion and flywheel. If high-pitched whine is heard after engine starts and key is released, distance between starter pinion and flywheel is too small. Locate high spot on flywheel before checking pinion-to-flywheel clearance. Pinion-to-flywheel clearance should be .020" (0.5 mm). See **Fig. 2**.
2. If loud, siren-like "whoop" sound is heard after the engine starts, drive assembly is likely defective. If "rumble", "growl" or "knock" is present as starter is coasting to a stop after starting engine, starter armature is bent or unbalanced.
3. If diagnosis indicates pinion should be closer to flywheel, ensure proper starter motor was installed. During initial starter motor installation, shim(s) are not used. If shim(s) are present, remove as necessary.
4. If diagnosis indicates starter should be moved away from flywheel, add shims as necessary. If

using .039" (1.0 mm) long shims, do not exceed 2 shims. If using .015" (.38 mm) long shims, do not exceed 3 shims. If condition is not corrected, and pinion-to-flywheel clearance has been reached, short shims may be added to outer side of starter motor bolt using .015" (.38 mm) shims. For starter removal, see STARTER under **REMOVAL & INSTALLATION**.



**Fig. 2: Measuring Pinion-To-Flywheel Clearance**  
Courtesy of GENERAL MOTORS CORP.

## ON-VEHICLE TESTING

**WARNING:** Vehicles are equipped with air bag supplemental restraint system. Before attempting ANY repairs involving steering column, instrument panel or related components, see SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM in the **AIR BAG RESTRAINT SYSTEM** article.

**NOTE:** The following tests assume that engine and battery are operating normally and are at operating temperatures, battery is charged, there are no engine problems that would cause a no-start condition, and no diagnostic trouble codes are present.

### SLOW OR NO CRANK AFTER EXTENDED PERIODS OF VEHICLE NON-USE

There may be a parasitic load on electrical system. See **PARASITIC LOAD EXPLANATION & TEST PROCEDURES** article in GENERAL INFORMATION section.

### ENGINE DOES NOT CRANK, STARTER SOLENOID DOES NOT CLICK

1. Place gear selector in Park (A/T) or depress clutch pedal (M/T). Place ignition switch to START position.

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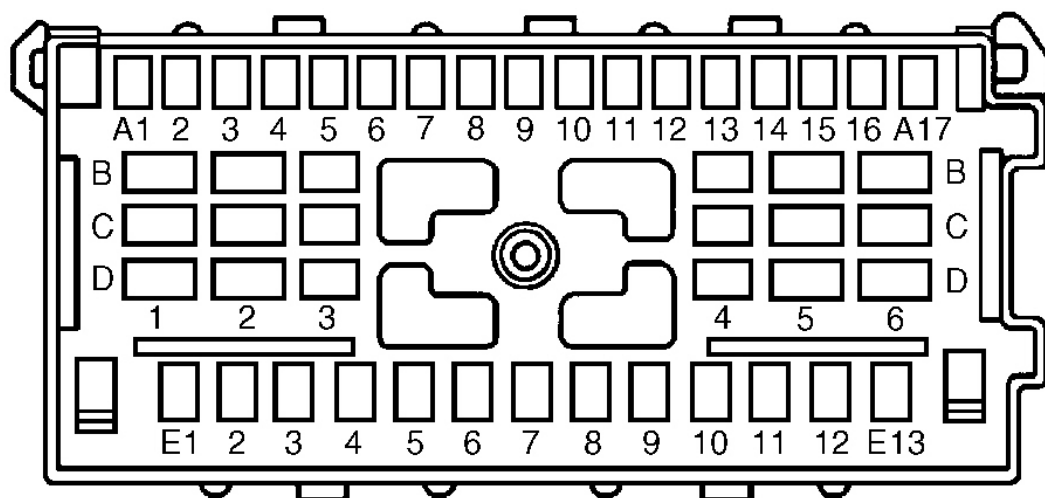
Using a DVOM, measure voltage between starter solenoid connector terminal "S" (Purple wire) and engine ground. If voltage is 9.6 volts or greater, go to next step. If voltage is lower than 9.6 volts, clean starter motor mounting blots, starter motor and mounting surface, and repeat test. If starter still does not engage, replace starter.

2. Remove starter relay from underhood fuse-relay center. See **COMPONENT LOCATIONS** table. Connect a test light, between starter relay connector terminal No. 30 and ground. If test light illuminates, check for an open in Purple wire between starter relay connector terminal No. 87 and starter solenoid terminal "S". If test light does not illuminate, check for open in Red wire along with Black fusible link between starter relay connector terminal No. 30 and generator. Also check for an open in Red wire along with Blue fusible link between battery positive terminal and generator.
3. Connect a fused jumper between starter relay terminals No. 85 and 86. Place gear selector in Park (A/T) or depress clutch pedal (M/T). Connect test light between starter relay connector terminal No. 86 and ground. Turn ignition switch to START position. If test light does not illuminate, go to next step. If test light illuminates check for an open in Black wire between starter relay connector terminal No. 86 and engine ground(s). See **WIRING DIAGRAMS** . If Black wire is okay replace, starter relay.
4. If vehicle is equipped with automatic transmission, go to next step. If vehicle is equipped with manual transmission, proceed to step 12).
5. Place gear selector in Park (A/T) or depress clutch pedal (M/T). Turn ignition switch to START position. Connect a test light between transmission range switch connector C1 terminal "G" (Yellow wire) and ground. If test light does not illuminate go to next step. If test light illuminates, check for an open in Yellow wire between transmission range switch connector C1 terminal "G" and starter relay connector terminal No. 85.
6. Turn ignition switch to START position. Connect a test light between transmission range switch connector C1 terminal "E" (Purple wire) and ground. If test light does not illuminate, go to next step. If test light illuminates, adjust or replace transmission switch.
7. Locate in line 7-pin Medium Gray C103 connector, located at left rear of engine compartment above brake booster. Disconnect 7-pin Medium Gray connector C103. Turn ignition switch to START position. Connect test light between female side of connector C103 terminal "A" (Purple wire) and ground. Turn ignition switch to START position. If test light does not illuminate, go to next step. If test light illuminates, check for an open in Purple wire between male side of connector C103 terminal "A" and transmission range switch connector C1 terminal "E".
8. Locate in line 56-pin Black C203 connector, located behind right side of instrument panel. Disconnect 56-pin Black connector C203. Turn ignition switch to START position. Connect test light between female side of connector C203 terminal A8 (Purple wire) and ground. Turn ignition switch to START position. If test light does not illuminate, go to next step. If test light illuminates, check for an open in Purple wire between male side of connector C203 terminal A8, female side of connector C103 terminal "A" and inflatable restraint diagnostic energy reserve module connector terminal B10.
9. Turn ignition switch to START position. Connect a test light between instrument panel fuse block connector terminal E1 (Purple wire) and ground. If test light does not illuminates, go to next step. If test light illuminates, check for an open in Purple wire between instrument panel fuse block connector terminal E1 and female side of connector C203 terminal A8. If wire is okay. replace 10-amp CRANK fuse No. 20.
10. Locate Black 48-pin connector C211, located at steering column harness. Backprobe Black 48-pin connector C211 terminal D1 (Yellow wire). See **Fig. 3** . Turn ignition switch to START position. Connect a test light between connector C211 terminal D1 (Yellow wire) and ground. If test light does not

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illuminate, go to next step. If test light illuminates, check for an open in Yellow wire between male side of connector C211 terminal D1 and instrument panel fuse block connector terminal D2.



VEHICLE SIDE

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**Fig. 3: Identifying Black 48-pin C211 Connector ("S" & "T" Series)**

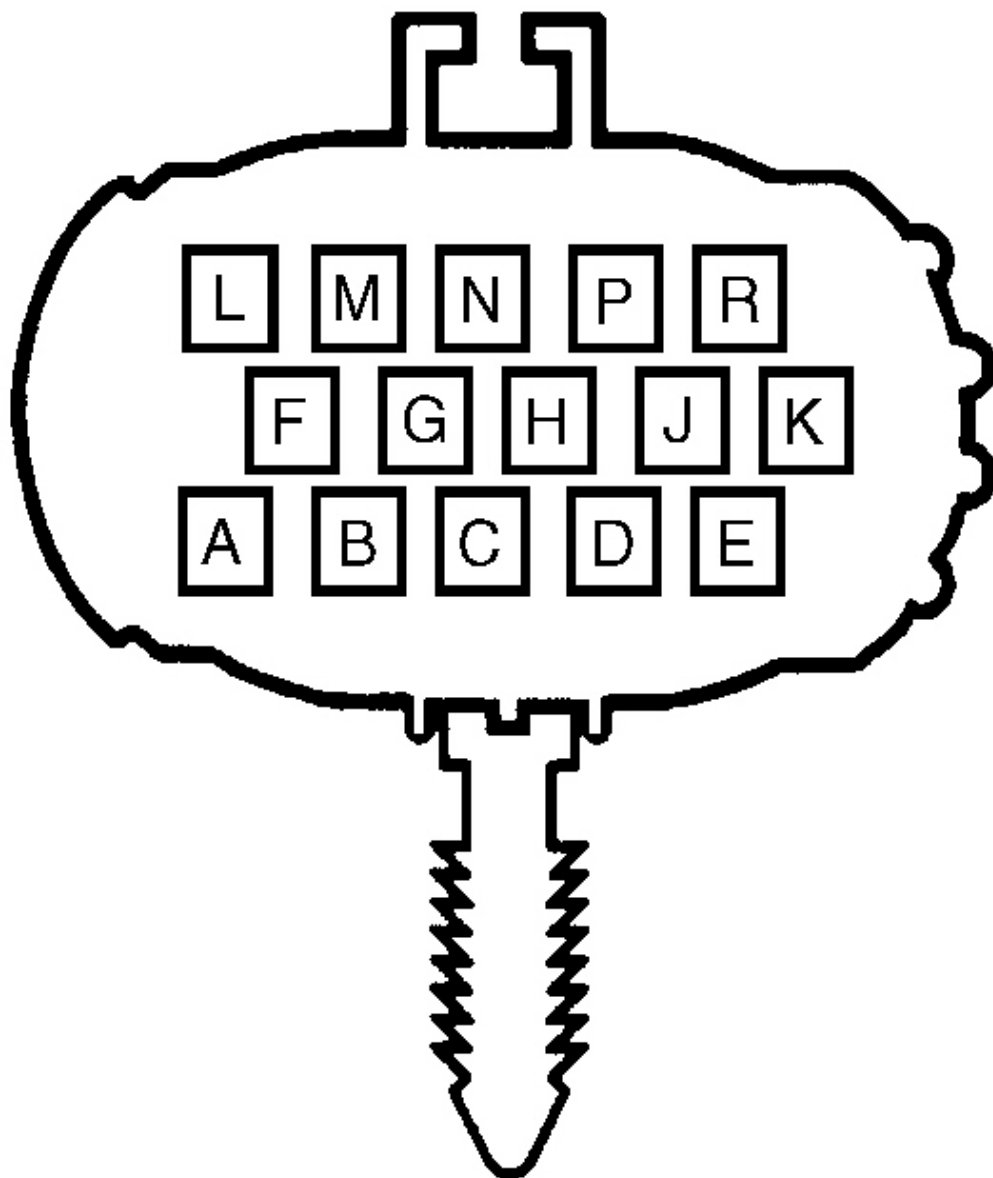
**Courtesy of GENERAL MOTORS CORP.**

11. Disconnect Black 48-pin connector C211. Turn ignition switch to START position. Connect test light between male side of connector C211 terminal D5 (Red wire) and ground. If test light does not illuminate, check for an open in Red wire between battery junction block Black fusible link and male side of connector C211 terminal D5. If Red wire is okay, replace battery junction block Black fusible link. If test light illuminates, replace ignition switch.
12. Locate Black 15-pin connector C102, located in at left rear of engine compartment above brake booster. Backprobe Black 15-pin connector C102 terminal "D" (Purple/White wire). See **Fig. 4** . Depress clutch pedal. Turn ignition switch to START position. Connect test light between connector C102 terminal "D" (Purple/White wire) and ground. If test light does not illuminate, go to next step. If test light illuminates, check for an open in Purple/White wire between male side of connector C102 terminal "D" and starter relay connector terminal No. 85.
13. Turn ignition switch to START position. Depress clutch pedal. Connect test light between clutch pedal position and cruise control shutoff switch connector terminal "C" (Purple/White wire) and ground. If test light does not illuminate, go to next step. If test light illuminates, check for an open in Purple/White wire between clutch pedal position and cruise control shutoff switch connector terminal "C", inflatable restrain shift control module connector terminal D16 and female side of connector C102 terminal "D".
14. Turn ignition switch to START position. Connect test light between clutch pedal position and cruise control shutoff switch connector terminal "A" (Purple wire) and ground. If test light does not illuminate, go to next step. If test light illuminates, replace clutch pedal position and cruise control shutoff switch.

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15. Locate 56-pin Black C203 connector, located behind right side of instrument panel. Disconnect 56-pin Black connector C203. See **Fig. 5** . Turn ignition switch to START position. Connect test light between female side of connector C203 terminal A8 (Purple wire) and ground. If test light does not illuminate, go to step 9). If test light illuminates, check for an open in Purple wire between male side of connector C203 terminal A8, clutch pedal position and cruise control shutoff switch connector terminal "A" and transfer case shift control module D16.

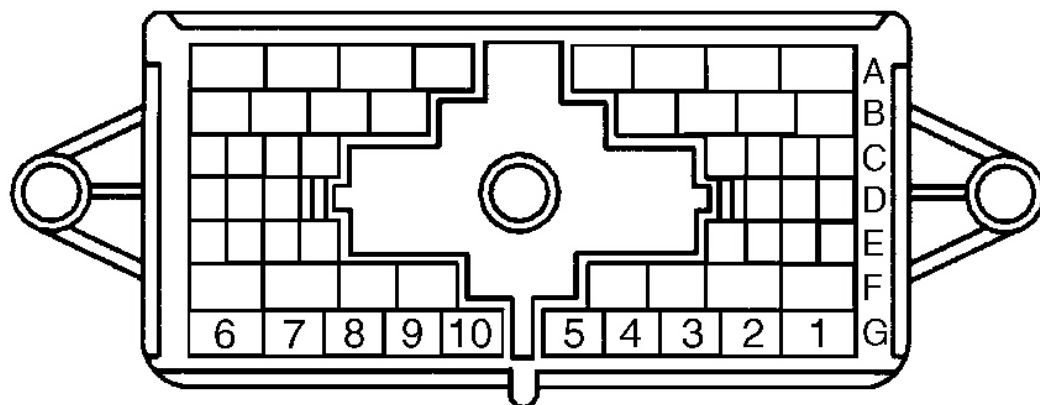


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**Fig. 4: Black 15-pin Connector C102 ("S" & "T" Series - M/T Only)**  
**Courtesy of GENERAL MOTORS CORP.**

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**Fig. 5: Black 56-pin Connector C203 ("S" & "T" Series)**  
Courtesy of GENERAL MOTORS CORP.

### SOLENOID CLICKS, ENGINE DOES NOT CRANK

1. Remove 20-amp ECM IGN fuse No. 10 from instrument panel fuse block. Turn ignition switch to START position and hold for 15 seconds. Using a DVOM, measure voltage between battery negative and positive terminals. If voltage is more than 9.5 volts, go to next step. If voltage is less than 9.5 volts or less, perform battery load test. If battery is okay, go to next step. If battery fails load test, replace battery and recheck symptom.
2. Turn ignition switch to START position. Using a DVOM, measure voltage between generator terminal (Red wire) and engine ground. If voltage is more than .5 volts, replace Black wire between generator and starter relay connector terminal No. 30 including Black fusible link, and recheck symptom. If voltage is .5 volts or less, go to next step.
3. Turn ignition switch to START position. Using a DVOM, measure voltage between generator terminal (Red wire) and battery negative terminal. If voltage is more than .5 volts, replace negative battery cable. If voltage is .5 volts or less, go to next step.
4. Turn ignition switch to START position. Using a DVOM, measure voltage between battery positive terminal and ground. If voltage is more than .5 volts, replace positive battery cable. If voltage is .5 volts or less, clean starter motor mounting bolts, starter motor and mounting surface, and repeat test. If starter still does not engage, replace starter and recheck symptom.

## BENCH TESTING

### PRELIMINARY TESTS

**NOTE:** On PG260 starter motor, starter is serviced as an assembly. If test values do not meet specifications, replace starter and solenoid as an assembly.



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Remove starter from vehicle. See STARTER under **REMOVAL & INSTALLATION** . Check starter for damage such as broken or stripped electrical terminals, broken or cracked drive end housing, etc.. If no obvious damage is found, perform starter no-load test and pinion clearance check before disassembling starter motor.

### SOLENOID WINDINGS TESTS

**NOTE:** To prevent overheating, **DO NOT** allow solenoid pull-in current to flow for more than 15 seconds.

**NOTE:** Current flow will decrease as windings heat up.

#### Hold-In Windings Test

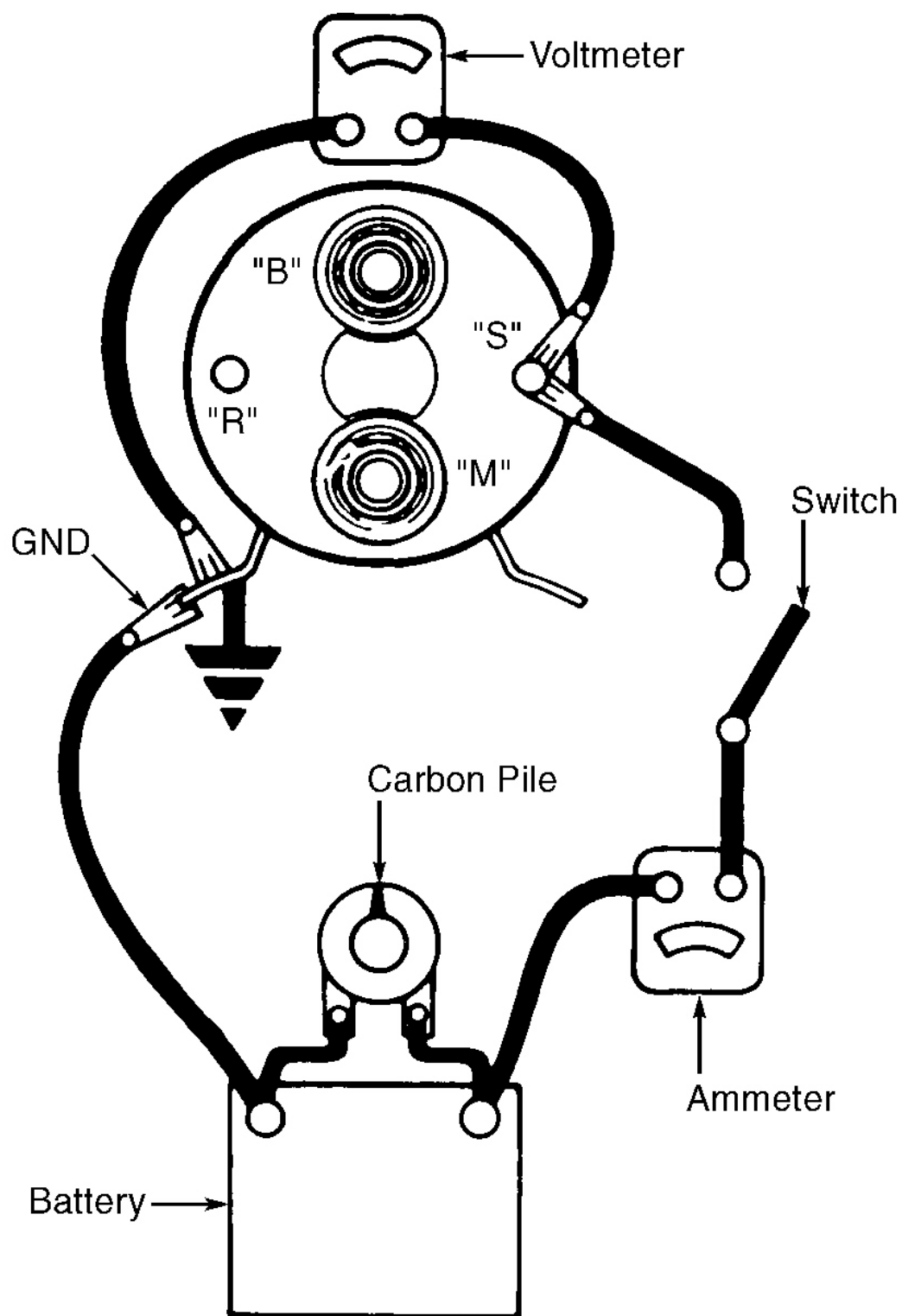
1. If solenoid is not removed from starter motor assembly, disconnect field lead from terminal "M" on solenoid and insulate field lead from solenoid motor terminal. Connect an ammeter and switch in series with 12-volt battery and starter solenoid terminal "S" as illustrated. See **Fig. 6** . Connect a voltmeter between solenoid terminal "S" and ground. Connect a carbon pile across battery.
2. Turn switch on and quickly adjust carbon pile load until voltage reads as specified. See **PULL-IN WINDINGS SPECIFICATIONS** table. Check ammeter reading. Turn off carbon pile and open switch. At 10 volts reading should be 10-20 amps. If amperage reading is not as specified, replace starter solenoid.

#### Pull-In Windings Test

Connect test equipment as in hold-in windings test. See HOLD-IN WINDINGS TEST. See **Fig. 6** . Ground starter solenoid terminal "M". Turn switch on and quickly adjust carbon pile load until voltage reads as specified. Check ammeter reading. Turn off carbon pile and open switch. At 10 volts reading should be 60-85 amps. If ammeter reading is not as specified, replace starter solenoid.

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**Fig. 6: Solenoid Winding Test Connections**  
**Courtesy of GENERAL MOTORS CORP.**

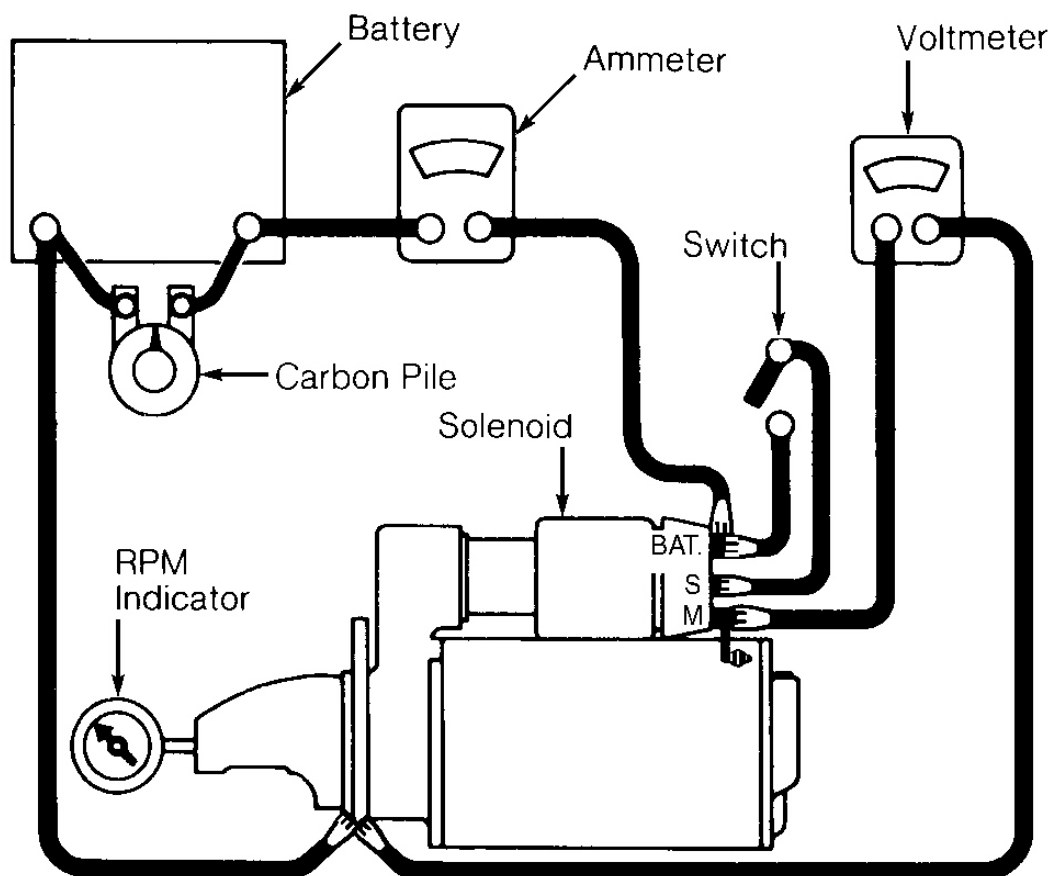
## **STARTER NO-LOAD TEST**

**CAUTION: DO NOT apply more voltage than specified. Excessive voltage may cause armature to throw windings due to excessive speed.**

1. Secure starter in vise. Turn carbon pile off and open switch. Connect test equipment to starter as illustrated. See **Fig. 7** . Turn switch on and adjust carbon pile until voltage reads as specified. See **STARTER NO-LOAD TEST SPECIFICATIONS** table. Check ammeter reading and pinion speed on RPM indicator. Turn off carbon pile and open switch. Compare RPM and amperage readings with specifications. See **STARTER NO-LOAD TEST SPECIFICATIONS** table.
2. If amperage and RPM readings are as specified, starter motor is okay. If test indicates low free speed and/or high current draw, unit may have tight, dirty or worn bearings or bushings, shorted or grounded armature, or a grounded field.
3. High current draw with pinion moving into cranking position but no pinion rotation indicates a direct ground in field, or frozen bearings or bushings. No pinion movement and a normal current reading indicates plunger is unable to move into solenoid or drive is unable to move on armature shaft. No pinion movement and very low or no current draw indicates an open or ground in solenoid windings.
4. Pinion moving into cranking position but not turning and very low current draw indicates an open in field circuit or armature windings, or no current flow between solenoid battery and motor field terminals while motor is engaged. Connect a jumper wire between solenoid battery and motor field terminal "M". If motor now turns at specified RPM, replace solenoid.
5. Low no-load and low current draw indicates high internal resistance due to poor brush lead connections; a dirty commutator; an open in armature windings; broken, worn or weak brush springs; or worn, damaged or dirty brushes. High no-load speed and high current draw indicates shorted field coils or shorted armature windings. If starter vibrates or is noisy, armature may be rubbing against inside of frame and field.

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**Fig. 7: Starter No-Load Test Connections**  
Courtesy of GENERAL MOTORS CORP.

### STARTER NO-LOAD TEST SPECIFICATIONS

Application	Starter RPM	(1) Amps
2.2L SD205	52-76	6,000-12,900
4.3L PG260	(1) 50-62	8,500-10,700

(1) At 10 volts.

### PULL-IN WINDINGS SPECIFICATIONS

Application	Starter Motor	Amps
2.2L	SD205	(1) 60-85
4.3L	PG260	(2) 30-50

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(1) At 10 volts.

(2) At 11.5 volts.

### ARMATURE TEST

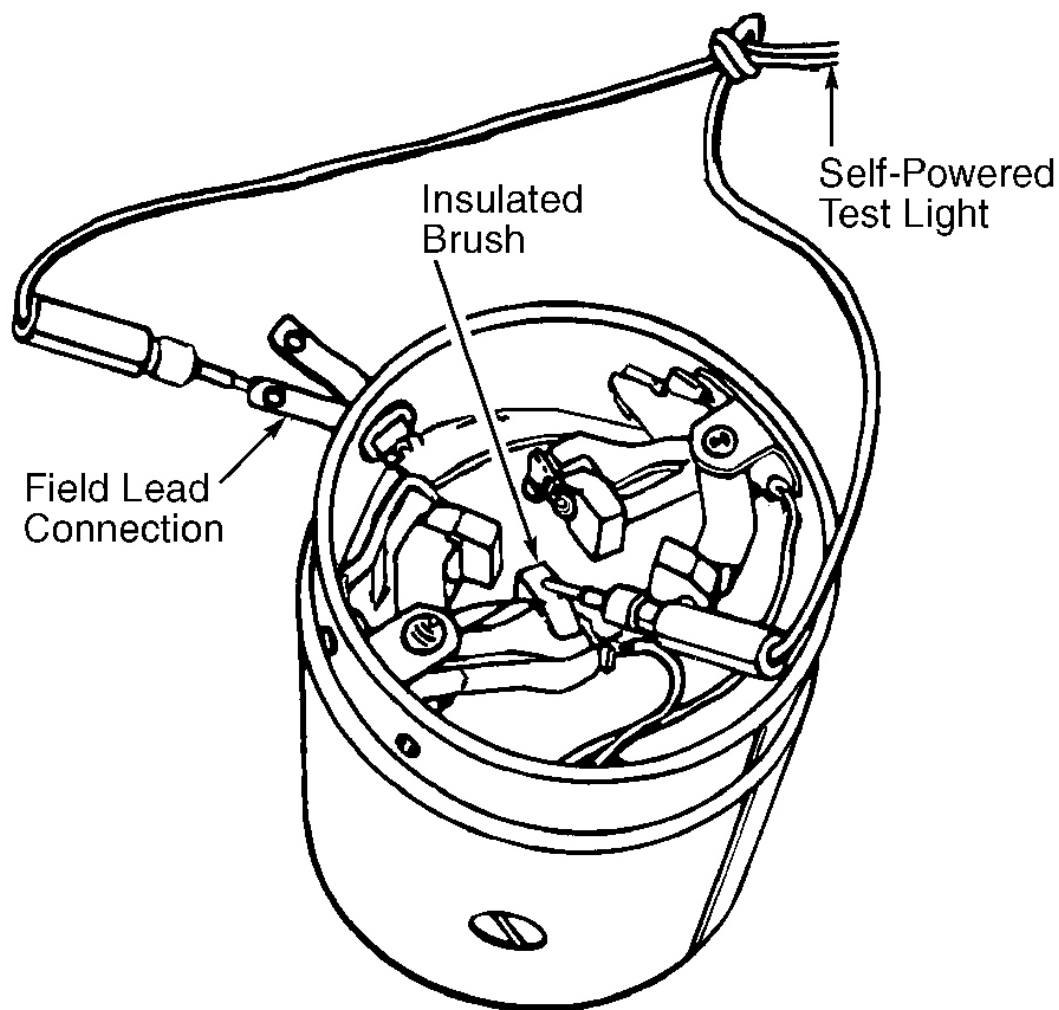
**NOTE:** Any ball bearings that are removed from armature must be replaced with new bearings.

1. Inspect solder joints between armature windings and commutator bars. If any have come loose, replace armature. If commutator is rough or damaged, replace armature. **DO NOT** turn commutator in lathe or undercut spaces between bars. If commutator is dirty, clean with 400 grit emery cloth and blow away any copper dust.
2. Using growler, check armature for shorts. Hold a flat steel strip on armature parallel to armature core or shaft. Rotate armature in growler. Steel strip will vibrate on area of short circuit.
3. Using self-powered test light, place one lead on armature shaft and other lead on commutator. Test light should not illuminate. If test light illuminates, armature is shorted or grounded and must be replaced.
4. If no-load test indicated armature may be rubbing against inside of frame and field assembly, inspect outside of armature for signs of rubbing. If armature is scored only on one side of laminations, armature shaft may be bent and armature should be replaced. If scoring is all around armature laminations, check frame and field assembly for an out-of-position pole or for a foreign object lodged inside. Repair or replace frame and field assembly.

**CAUTION:** Some starters have a molded-type commutator. **DO NOT** undercut insulation as it may cause serious damage to commutator.

### FIELD COIL OPEN TEST

Remove armature from frame and field assembly. Using self-powered test light, place one lead on field lead connection and other lead on one insulated brush. See **Fig. 8** . Test light should illuminate. If test light does not illuminate, field coil is open. Repair or replace field and frame assembly. Repeat test for each insulated brush.



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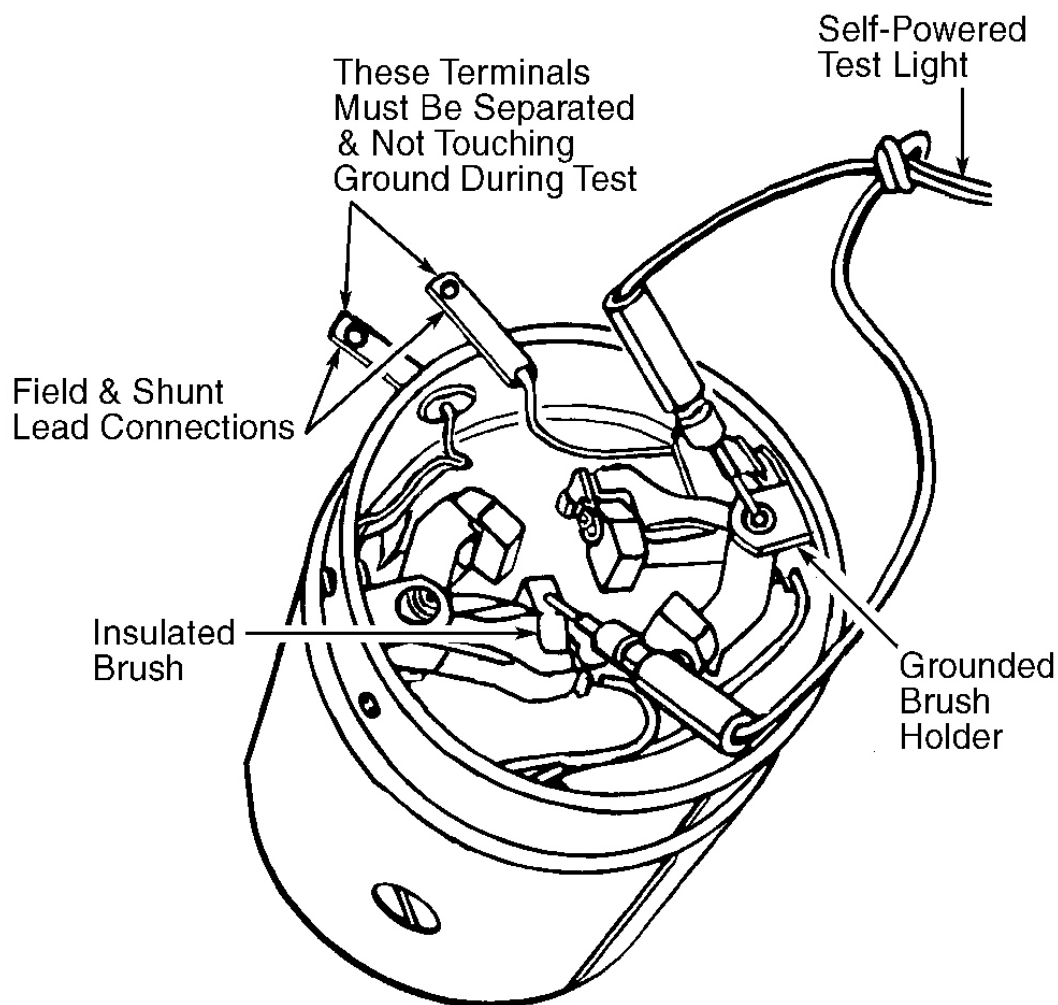
**Fig. 8: Testing Field Coil For Open**  
Courtesy of GENERAL MOTORS CORP.

### FIELD COIL GROUND TEST

Remove armature from field and frame assembly. On starters with shunt lead, separate field and shunt lead connections during test. Ensure field lead connection is NOT touching ground during test. Using self-powered test light, place one lead on grounded brush holder and other lead on one insulated brush. See **Fig. 9** . Test light should not illuminate. If test light illuminates, field coil is grounded. Repair or replace field and frame assembly. Repeat test for each insulated brush.

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**Fig. 9: Testing Field Coil For Ground**  
Courtesy of GENERAL MOTORS CORP.

### BRUSHES, SPRINGS & HOLDERS CHECK

If any brushes are damaged (oil-soaked or pitted) or worn more than 90 percent, replace, frame and fields. If brushes are not damaged and still have more than 50 percent of brush material left, use a soft cloth to clean contact face of brushes. Check brush spring tension and replace springs if weak, discolored or distorted. Ensure brush holders are clean and brushes are not binding in holders. Ensure full surface of brush contacts commutator for proper performance.

### COMMUTATOR END FRAME & BEARING

Replace armature assembly if commutator outer diameter is less than 1.378" (36 mm) or if undercut depth is

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less than .008" (.2 mm). **DO NOT** undercut insulation. Ensure commutator end bearing has not spun in frame. If bearing has spun, replace frame and bearing. **DO NOT** lubricate bearing. If bearing is dry or damaged, replace bearing. Install new bearing no deeper than .080 in (2.1 mm).

### DRIVE END HOUSING & BEARING

Ensure drive end bearing has not spun in housing. If bearing has spun, replace housing and bearing. **DO NOT** lubricate bearing. If bearing is dry or damaged, replace bearing. Install new bearing no deeper than .010 in (.4 mm).

### DRIVE ASSEMBLY CHECK

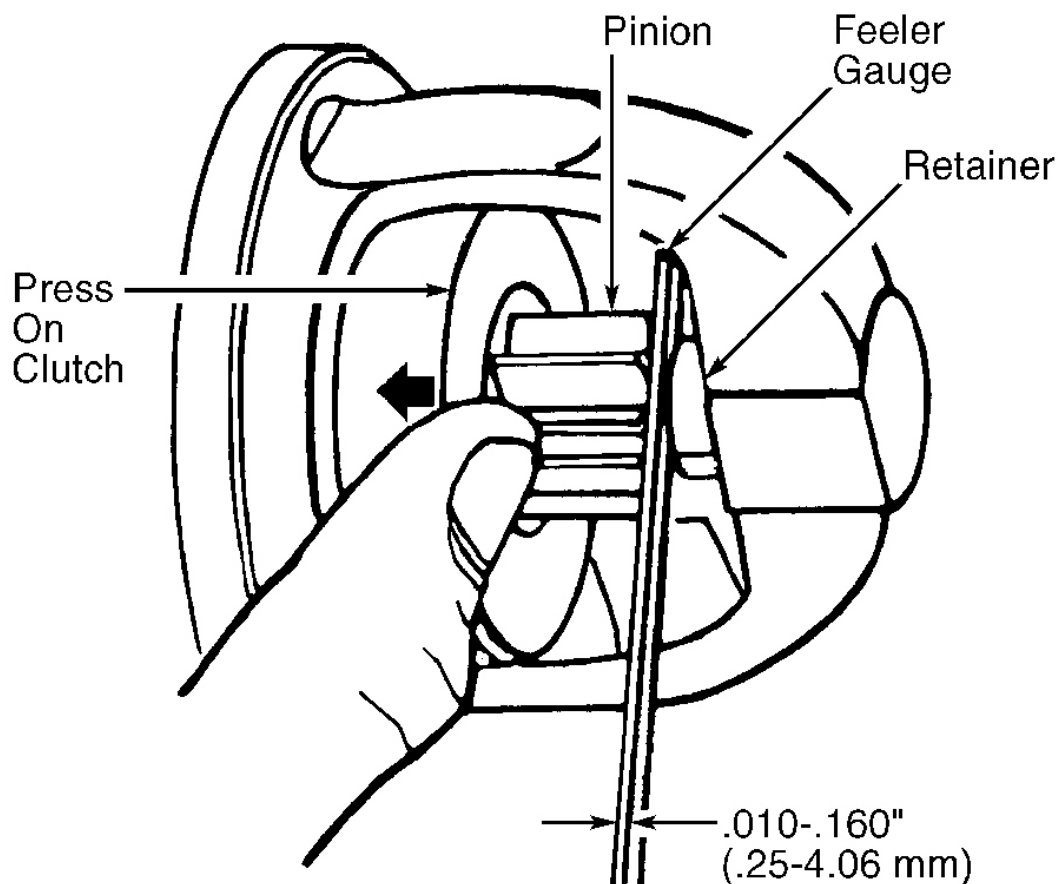
1. Check pinion teeth for chips, cracks or excessive wear. If pinion teeth are damaged, replace drive assembly. Also check flywheel for damage. Check drive assembly for slipping before disassembly from armature. With drive assembly attached to armature, cover armature with shop towels and secure in a vise.
2. Using a 12-point socket and a torque wrench, turn pinion counterclockwise. Pinion should lock and withstand a torque of 50 ft. lbs. (68 N.m) without slipping. If pinion slips before 50 ft. lbs. (68 N.m) is reached, replace drive assembly.
3. Using a 12-point socket and a torque wrench, turn pinion clockwise. Pinion should turn freely in overrunning direction (clockwise) only. If pinion does not turn freely in clockwise direction, replace drive assembly.

### PINION CLEARANCE CHECK

**NOTE:** Pinion clearance is not adjustable. If clearance is not within specification, disassemble and check starter motor for worn or damaged components.

1. Secure starter motor in vise with opening in housing accessible for measurement. Disconnect field lead at solenoid terminal "M" and insulate from solenoid field terminal "M". Connect battery negative terminal lead to starter frame. Connect 12 volts to starter solenoid terminal "S". Momentarily touch jumper lead from starter solenoid terminal "M" to starter frame, shifting pinion into cranking position.
2. Push pinion as far as possible away from retainer. Using a feeler gauge, ensure there is .010-.160" (.25-4.06 mm) clearance between pinion and retainer. See **Fig. 10**.





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**Fig. 10: Checking Pinion Clearance**

Courtesy of GENERAL MOTORS CORP.

## REMOVAL & INSTALLATION

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in the GENERAL INFORMATION section before disconnecting battery.

**NOTE:** Vehicles are designed for starter mounting without shims. A short shim or long shims may have been added to correct a noise or engagement condition. When installing starter any previously installed shims should be replaced in original location to ensure proper pinion to flywheel clearance.

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### STARTER

#### Removal

On all engines, disconnect negative battery cable. Raise and support vehicle.

On 2.2L engine, remove front exhaust pipe. Remove brace rod from front of engine to clutch housing. Remove starter heat shield. Remove starter solenoid terminal "S" nut and battery cable nut. Separate wiring from starter. Remove brush end bracket attaching bolt. Remove starter mounting bolts. Remove shims and note arrangement for reassembly. If necessary remove brush end bracket from starter.

On 4.3L engine, remove front exhaust pipe. Remove starter solenoid terminal "S" nut and battery cable nut. Separate wiring from starter. Remove starter mounting bolts. Remove shims and note arrangement for reassembly.

On 4.3L 4WD, disconnect engine mounts. Raise and support engine. Remove transmission mount and support transmission assembly. Remove starter mounting bolts. Remove shims and note arrangement for reassembly. Remove starter solenoid terminal "S" nut and battery cable nut. Separate wiring from starter.

On 4WD Utility, remove starter solenoid terminal "S" nut and battery cable nut. Separate wiring from starter. If equipped remove transfer case shield. Remove bolts and two brackets holding brake pipe to transmission crossmember. Remove transmission crossmember attaching bolts. Remove transmission mount bolts and support transmission assembly. Slide transmission crossmember out of way. Remove bracket that holds transmission fluid cooler lines to flywheel housing. Remove brace rod to flywheel housing and lower flywheel housing. Remove starter mounting bolts. Remove shims and note arrangement for reassembly.

#### Installation

To install, reverse removal procedure. Ensure shims are installed in original location. Tighten starter mounting bolts to specification. See **TORQUE SPECIFICATIONS** .

### OVERHAUL

#### STARTER & SOLENOID

**CAUTION: DO NOT** clean starter in degreasing tank or with grease dissolving solvents. This will remove lubricant from clutch mechanism, and damage insulation on armature and field coil.

**NOTE:** When reassembling starter and solenoid, use grease (10477431) for lubrication. Use of other greases may cause starter failure.

**NOTE:** On PG260 starter motor, starter and solenoid are not overhauled and are replaced as a complete assembly.

#### Disassembly

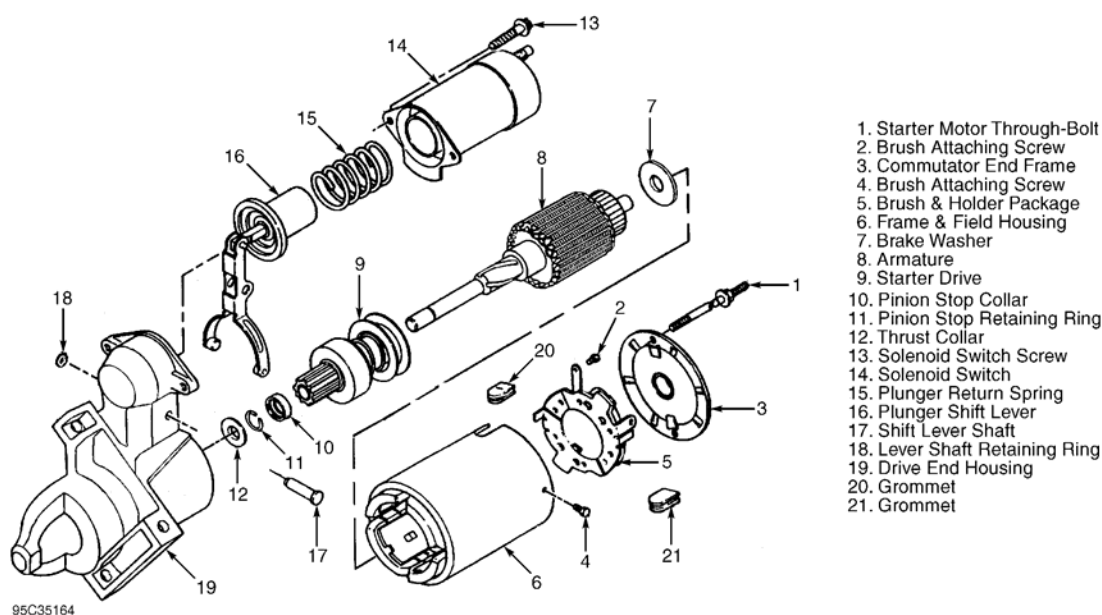
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1. Remove solenoid by turning 90 degrees pulling solenoid out of starter. If shaft needs to be drilled out, a new shaft and retaining ring will be needed for reassembly. Check starter drive for slippage before removing from armature shaft. Pinion stop color ring is not re-used. See **Fig. 11** and **Fig. 12**.

### Assembly

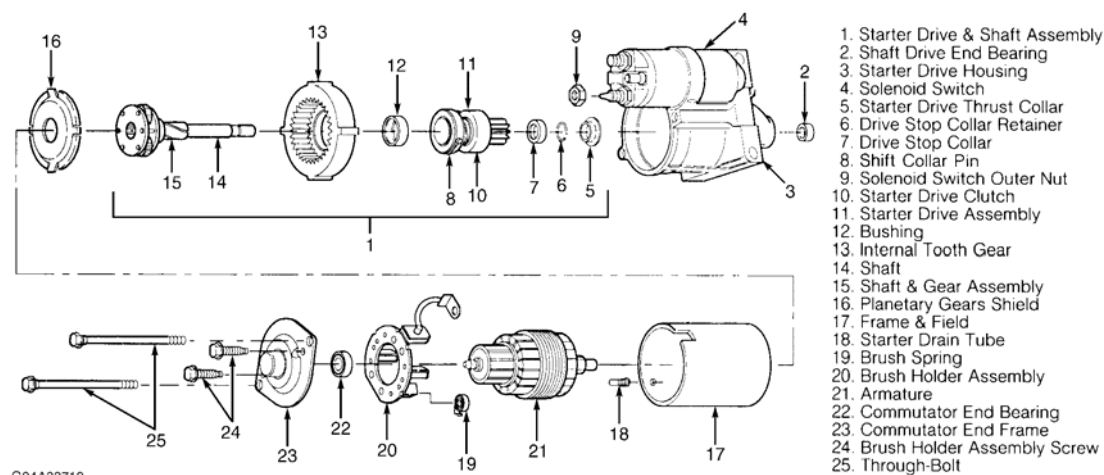
1. Apply a small amount of lubricant to armature shaft and to starter drive contact points. Use 2 sets of pliers to snap pinion stop collar over retainer ring. Lubricate solenoid core with grease. Apply grease evenly around inside edge of solenoid core. Apply thickly to first 1/2 (13 mm) inside edge of core. Plunger movement will distribute grease properly. Soak new drive end bushing in oil, before installation, for at least 30 minutes. To install, reverse removal procedure.



**Fig. 11: Exploded View Of Delco-Remy Starter Motor (SD205 & SD255)**  
**Courtesy of GENERAL MOTORS CORP.**

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**Fig. 12: Exploded View Of Delco-Remy Starter Motor (PG250)**  
Courtesy of GENERAL MOTORS CORP.

## TORQUE SPECIFICATIONS

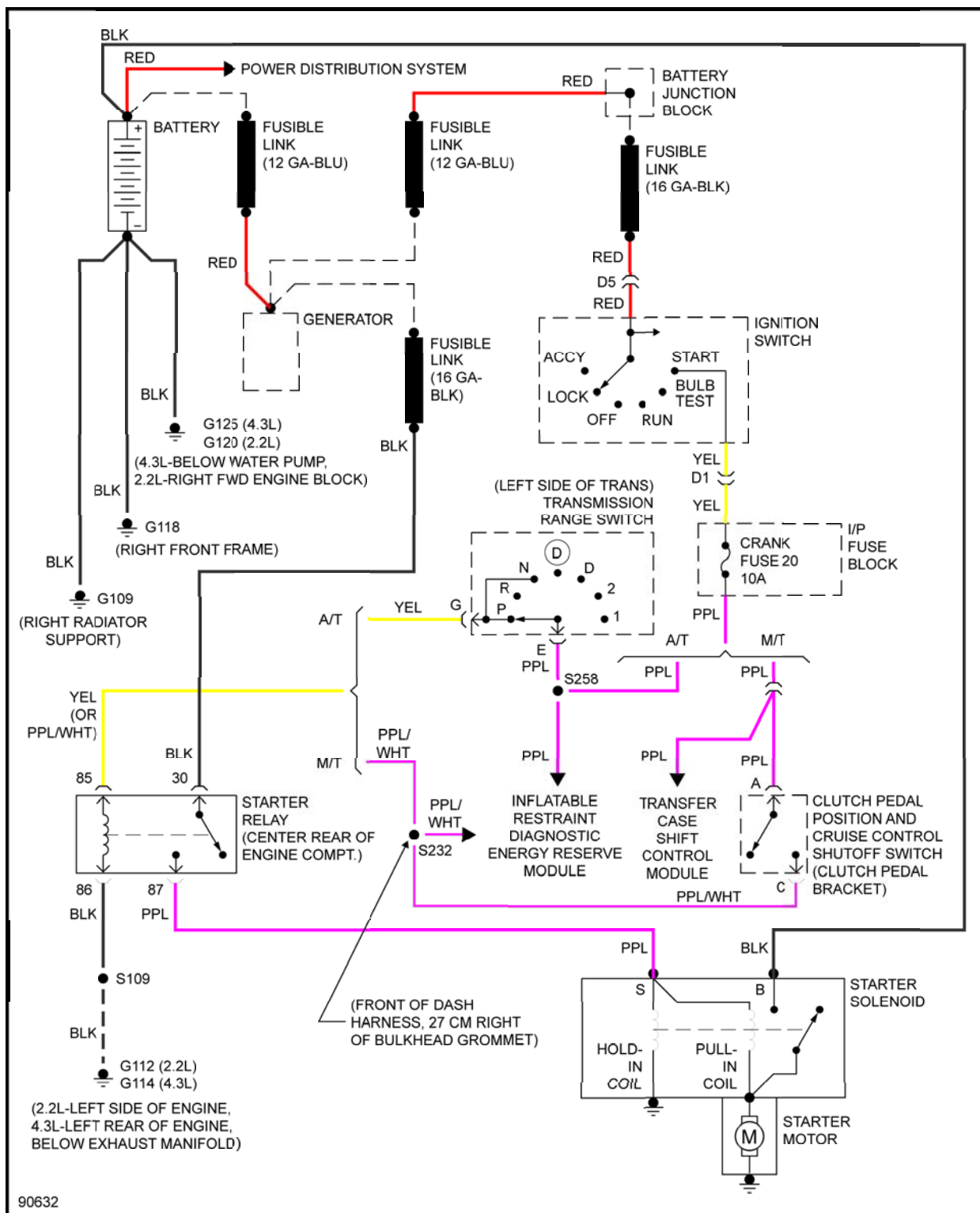
### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Starter Bracket-To-Engine Bolts (2.2L, 2WD)	33 (45)
Starter Mounting Bolts	
"S" Series Pickup	33 (45)
"S" & "T" Series Blazer	35 (47)
"T" Series Pickup	35 (47)
	In. Lbs. (N.m)
Solenoid To Starter Bolts & Screws	70 (7)
Solenoid Terminals Inner Nuts	71 (8)

## WIRING DIAGRAMS

# 1997 Chevrolet S10 Pickup

1997 ELECTRICAL General Motors Corp. - Starters



1997 Chevrolet S10 Pickup
1997 ELECTRICAL General Motors Corp. - Starters

**Fig. 13: Starting System Schematic ("S" & "T" Series)**